

Infant Memory for Modality-Specific Properties of Contingent and Noncontingent Events: The Role of Intersensory Redundancy in Self Perception

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Introduction

According to the Intersensory Redundancy Hypothesis (IRH), amodal properties such as rhythm and tempo are more salient in multimodal stimulation than in unimodal stimulation in early development. In contrast, modality-specific properties such as color and pattern are more salient in unimodal nonredundant stimulation than in multimodal redundant stimulation (Bahrick & Lickliter, 2002). This study extended predictions of the IRH to the domain of self perception in young infants. Research has found that infants can detect the difference between a contingent live display of their own legs versus a non-contingent display of another infant's legs by detecting amodal temporal information (Bahrick & Watson, 1985). In the present study, we asked if 5-month-old infants could detect and remember modality-specific information (color/pattern of socks) better when habituated to a nonredundant (noncontingent) presentation of an infant's legs moving than a redundant (contingent) presentation of their own legs moving. Redundancy was provided by the proprioceptive-visual contingency between the infants' feeling of their own legs moving and a live video display of their own legs moving. We predicted that in noncontingent stimulation, detection and memory for the color/pattern of the socks would be facilitated, whereas in contingent stimulation, it would be attenuated because infants would selectively attend to the redundant proprioceptive-visual contingency at the expense of modality-specific information.

Stimulus Events

Infants wore one of three versions of colorful socks (see Figure 1). During habituation, the non-contingent display consisted of a prerecorded video of infants' legs kicking wearing one of the three pairs of socks. The contingent display consisted of a live video of the infants' own legs kicking wearing one of the three pairs of socks. During the visual paired-comparison procedure (memory test), the events consisted of two side by side noncontingent displays of infants' legs kicking, each wearing a different pair of socks.

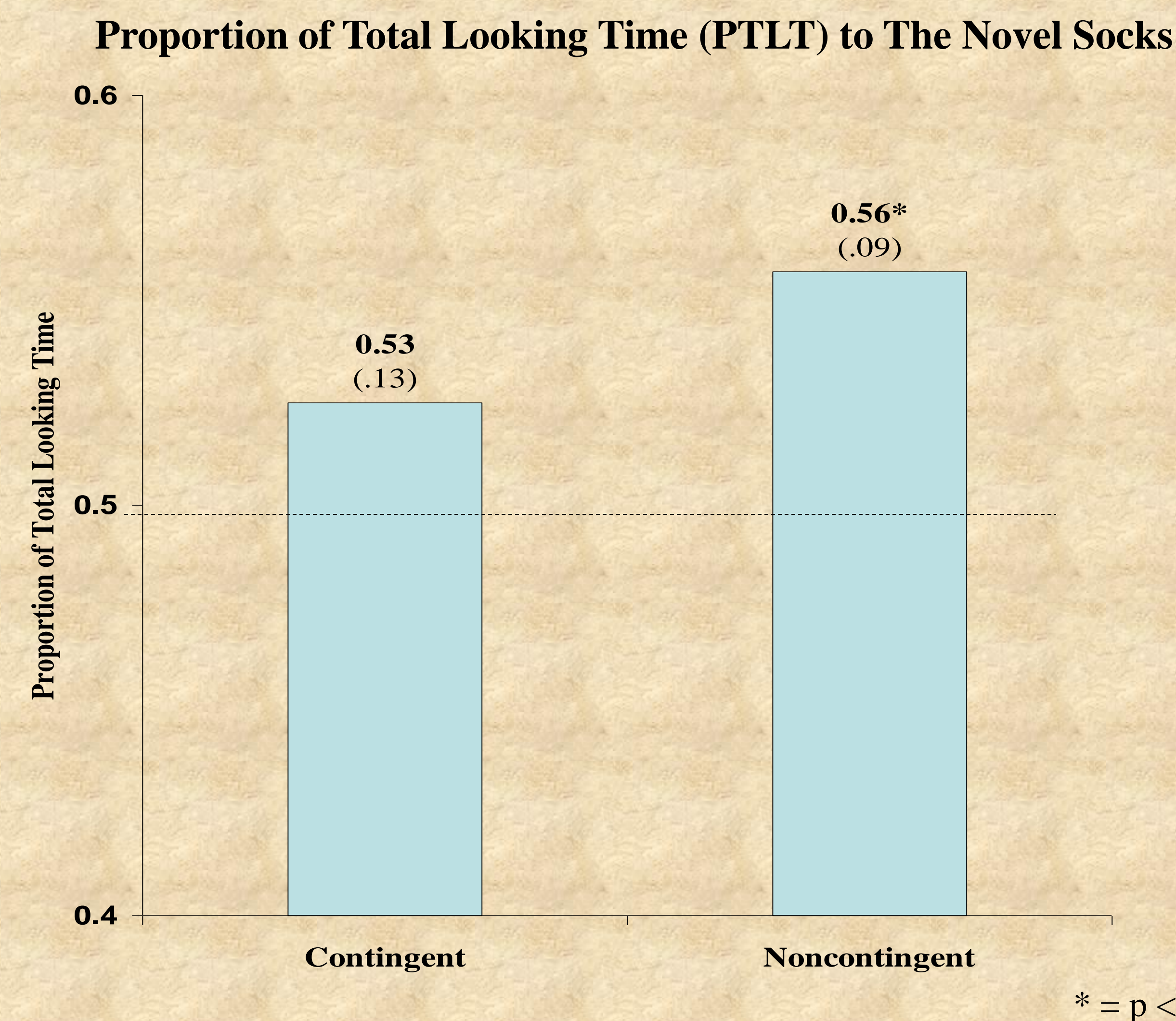
Method

Thirty-two 5-month-old infants were habituated (in an infant control procedure) to either a contingent (live self) or a noncontingent video display of infants' legs kicking wearing the colorful socks. Within each condition the stimuli were counterbalanced across infants. After the habituation phase, there was a 15-minute delay. Then all infants participated in a visual paired-comparison procedure in which two dynamic displays of infants' legs kicking (noncontingently) were presented side by side. One display depicted the familiar pair of socks and the other, a novel pair of socks, in two blocks of four 15-second trials each, with lateral positions of the familiar and novel displays counterbalanced across blocks.

Figure 1



Figure 2



Results

The primary measure of interest was the proportion of total looking time (PTLT) to the novel socks during the visual paired-comparison procedure. A single-sample t-test was conducted on the mean PTLT to the novel socks against the chance value of .5 for each condition. Results (see Figure 2) indicated a significant PTLT to the novel socks for infants in the noncontingent condition ($p < .05$) but no significant preference for infants in the contingent condition ($p > .1$).

Conclusions

These results demonstrate that when 5-month-old infants were habituated to a dynamic, non-contingent display of infants' legs wearing colorful socks, they attended to the color/pattern of the socks and remembered them 15 minutes later. Infants looked preferentially to the novel over the familiar pair of socks in the paired comparison test. In contrast, infants habituated to a contingent live video of their own legs kicking (providing proprioceptive-visual redundancy) showed no evidence of attending to or remembering the color/pattern of the socks, suggesting that the proprioceptive-visual contingency competed for their attention. These results are consistent with predictions of the IRH and indicate that detection and memory of non-redundant, modality specific information is facilitated in unimodal (visual) stimulation and attenuated in bimodal (proprioceptive-visual) stimulation. These findings also extend prior research generated from the IRH from object perception to the domain of self perception and from audiovisual redundancy provided by objects to proprioceptive-visual redundancy provided by self motion.

References

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